Regents Review Test 1

Base your answers to questions **1** and **2** on the statement below.

The spectrum of visible light emitted during transitions in excited hydrogen atoms is composed of blue, green, red, and violet lines.

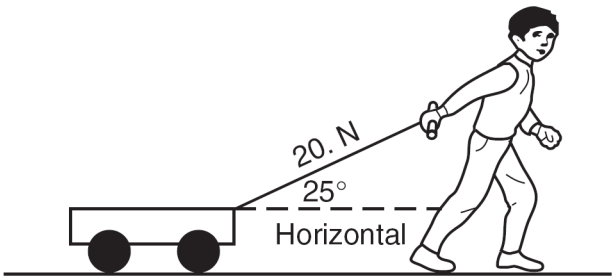
1. What characteristic of light determines the amount of energy carried by a photon of that light?
   1) frequency
   2) amplitude
   3) velocity
   4) phase

2. Which color of light in the visible hydrogen spectrum has photons of the shortest wavelength?
   1) blue
   2) green
   3) violet
   4) red

---

3. Parallel wave fronts incident on an opening in a barrier are diffracted. For which combination of wavelength and size of opening will diffraction effects be greatest?
   1) long wavelength and wide opening
   2) short wavelength and wide opening
   3) long wavelength and narrow opening
   4) short wavelength and narrow opening

4. As shown in the diagram below, a child applies a constant 20.-newton force along the handle of a wagon which makes a 25° angle with the horizontal.



How much work does the child do in moving the wagon a horizontal distance of 4.0 meters?
   1) 80. J
   2) 34 J
   3) 5.0 J
   4) 73 J

5. What is the speed of a 2.5-kilogram mass after it has fallen freely from rest through a distance of 12 meters?
   1) 4.8 m/s
   2) 43 m/s
   3) 30. m/s
   4) 15 m/s

6. As a block slides across a table, its speed decreases while its temperature increases. Which two changes occur in the block's energy as it slides?
   1) a decrease in both kinetic energy and internal energy
   2) an increase in kinetic energy and a decrease in internal energy
   3) an increase in both kinetic energy and internal energy
   4) a decrease in kinetic energy and an increase in internal energy

Version C

Regents Review Test 1

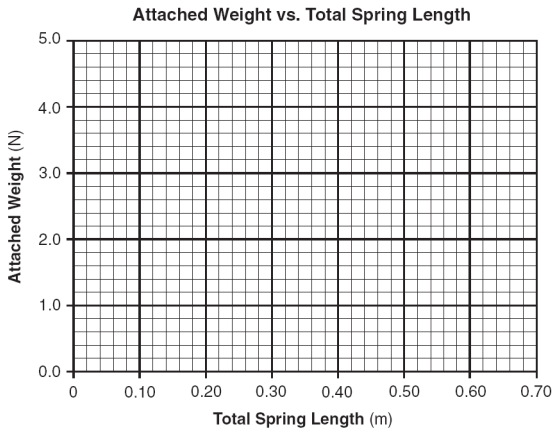
Base your answers to questions **7** through **9** on the information and data table below.

A student performed an experiment in which the weight attached to a suspended spring was varied and the resulting total length of the spring measured. The data for the experiment are in the table below.

Attached Weight vs. Total Spring Length

Attached Weight (N)	**Total Spring Length** (m)
0.98	0.37
1.96	0.42
2.94	0.51
3.92	0.59
4.91	0.64

7. Plot the data points for the attached weight versus total spring length.



8. Using your graph, determine the length of the spring before any weight was attached.

9. Draw the line or curve of best fit.

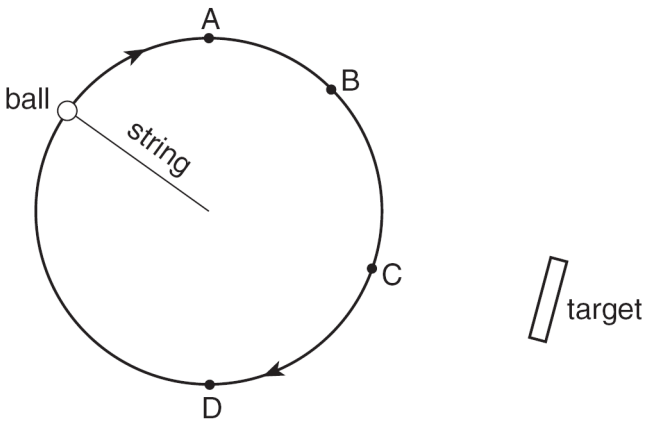
---

10. As an astronaut travels from the surface of Earth to a position that is four times as far away from the center of Earth, the astronaut's
    1) weight remains the same
    2) mass remains the same
    3) mass decreases
    4) weight increases

11. A photon of light traveling through space with a wavelength of 6.0×10^{-7} meter has an energy of
    1) 5.0×10^{14} J
    2) 4.0×10^{-40} J
    3) 5.4×10^{10} J
    4) 3.3×10^{-19} J

Version C

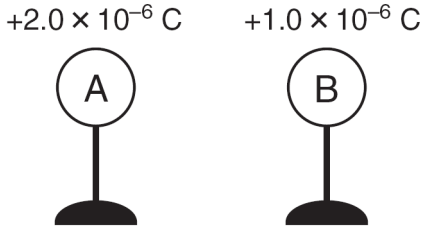
12. A ball attached to a string is moved at constant speed in a horizontal circular path. A target is located near the path of the ball as shown in the diagram.



At which point along the ball's path should the string be released, if the ball is to hit the target?

1) *A*
2) *B*
3) *C*
4) *D*

13. Two similar metal spheres, *A* and *B*, have charges of $+2.0 \times 10^{-6}$ coulomb and $+1.0 \times 10^{-6}$ coulomb, respectively, as shown in the diagram below.



The magnitude of the electrostatic force on *A* due to *B* is 2.4 newtons. What is the magnitude of the electrostatic force on *B* due to *A*?

1) 1.2 N
2) 2.4 N
3) 4.8 N
4) 9.6 N

14. **Note that the following question has only three choices.**

A 6.0-newton force and an 8.0-newton force act concurrently on a point. As the angle between these forces increases from 0° to 90°, the magnitude of their resultant

1) remains the same
2) increases
3) decreases

15. A 1.00-kilogram ball is dropped from the top of a building. Just before striking the ground, the ball's speed is 12.0 meters per second. What was the ball's gravitational potential energy, relative to the ground, at the instant it was dropped? [Neglect friction.]

1) 6.00 J
2) 24.0 J
3) 144 J
4) 72.0 J

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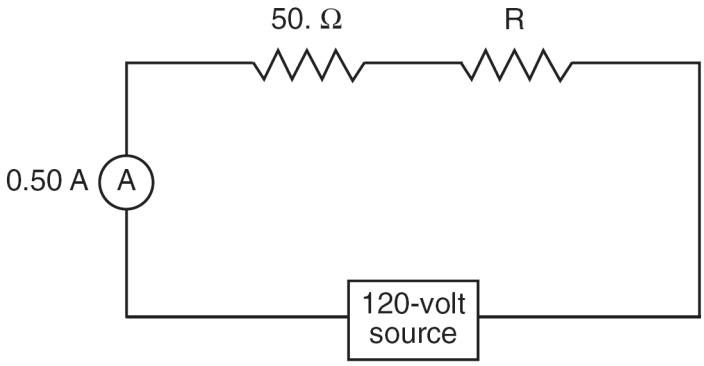
Regents Review Test 1

Base your answers to questions **16** through **18** on the information and diagram below.

A 50.-ohm resistor, an unknown resistor *R*, a 120-volt source, and an ammeter are connected in a complete circuit. The ammeter reads 0.50 ampere.



16. Calculate the equivalent resistance of the circuit. [Show all work, including the equation and substitution with units.]

17. Calculate the power dissipated by the 50.-ohm resistor. [Show all work, including the equation and substitution with units.]

18. Determine the resistance of resistor R.

_____ Ω

---

19. The charge of an antistrange quark is approximately
    1) -5.33×10^{-20} C
    2) $+5.33 \times 10^{-20}$ C
    3) $+5.33 \times 10^{20}$ C
    4) -5.33×10^{20} C

20. Which statement best describes a proton that is being accelerated?
    1) It absorbs a neutron to become an electron.
    2) The magnitude of its charge increases.
    3) It is attracted to other protons.
    4) It produces electromagnetic radiation.

21. Which is a vector quantity?
    1) electric potential difference
    2) electric charge
    3) electric resistance
    4) electric field strength

22. A ringing bell is located in a chamber. When the air is removed from the chamber, why can the bell be seen vibrating but *not* be heard?
    1) Sound waves have higher frequency than light waves.
    2) Light waves travel slower than sound waves.
    3) Sound waves have greater amplitude than light waves.
    4) Light waves can travel through a vacuum, but sound waves cannot.

23. Which wave phenomenon occurs when vibrations in one object cause vibrations in a second object?
    1) intensity
    2) resonance
    3) reflection
    4) tuning

Version C

Regents Review Test 1

Base your answers to questions **24** through **26** on the passage below.

More Sci- Than Fi, Physicists Create Antimatter

Physicists working in Europe announced yesterday that they had passed through nature's looking glass and had created atoms made of antimatter, or antiatoms, opening up the possibility of experiments in a realm once reserved for science fiction writers. Such experiments, theorists say, could test some of the basic tenets of modern physics and light the way to a deeper understanding of nature.

By corralling [holding together in groups] clouds of antimatter particles in a cylindrical chamber laced with detectors and electric and magnetic fields, the physicists assembled antihydrogen atoms, the looking glass equivalent of hydrogen, the most simple atom in nature. Whereas hydrogen consists of a positively charged proton circled by a negatively charged electron, in antihydrogen the proton's counterpart, a positively charged antiproton, is circled by an antielectron, otherwise known as a positron.

According to the standard theories of physics, the antimatter universe should look identical to our own. Antihydrogen and hydrogen atoms should have the same properties, emitting the exact same frequencies of light, for example. . . .Antimatter has been part of physics since 1927 when its existence was predicted by the British physicist Paul Dirac. The antielectron, or positron, was discovered in 1932. According to the theory, matter can only be created in particleantiparticle pairs. It is still a mystery, cosmologists say, why the universe seems to be overwhelmingly composed of normal matter.

Dennis Overbye, "More Sci- Than Fi, Physicists Create Antimatter," New York Times, Sept. 19, 2002

24. According to the article, why is it a mystery that "the universe seems to be overwhelmingly composed of normal matter"?

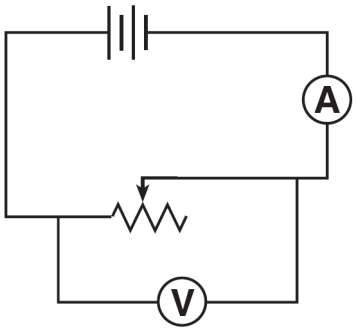
25. The author of the passage concerning antimatter incorrectly reported the findings of the experiment on antimatter. Which particle mentioned in the article has the charge incorrectly identified?

26. How should the emission spectrum of antihydrogen compare to the emission spectrum of hydrogen?

---

27. A 0.15-kilogram baseball moving at 20. meters per second is stopped by a catcher in 0.010 second. The average force stopping the ball is
    1) 3.0×10^{1} N
    2) 3.0×10^{-2} N
    3) 3.0×10^{0} N
    4) 3.0×10^{2} N

28. The diagram below represents a simple circuit consisting of a variable resistor, a battery, an ammeter, and a voltmeter.



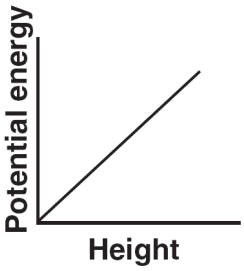
What is the effect of increasing the resistance of the variable resistor from 1000 Ω to 10000 Ω? [Assume constant temperature.]

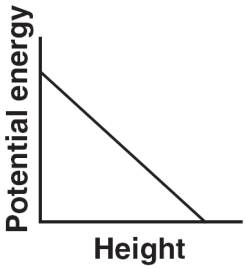
1) The ammeter reading increases.
2) The voltmeter reading decreases.
3) The ammeter reading decreases.
4) The voltmeter reading increases.

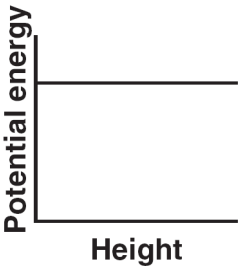
Version C

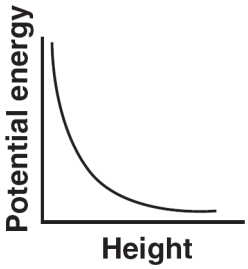
Regents Review Test 1

29. Which graph best represents the relationship between the gravitational potential energy of an object near the surface of Earth and its height above Earth's surface?

1) 

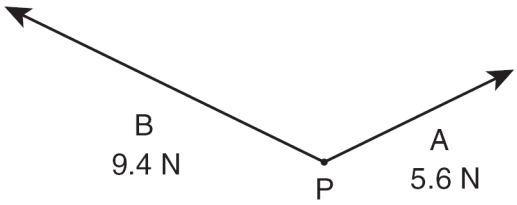
2) 

3) 

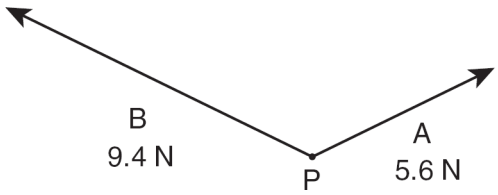
4) 

Base your answers to questions **30** through **32** on the information and diagram below.

Force *A* with a magnitude of 5.6 newtons and force *B* with a magnitude of 9.4 newtons act concurrently on point *P*.



30. On the diagram below, use a ruler and protractor to construct a vector representing the resultant of forces *A* and *B*.



31. Determine the magnitude of the resultant force.

32. Determine the scale used in the diagram.

1.0 cm = _____ N

---

33. What fundamental force holds quarks together to form particles such as protons and neutrons?
    1) gravitational force
    2) electromagnetic force
    3) strong force
    4) weak force

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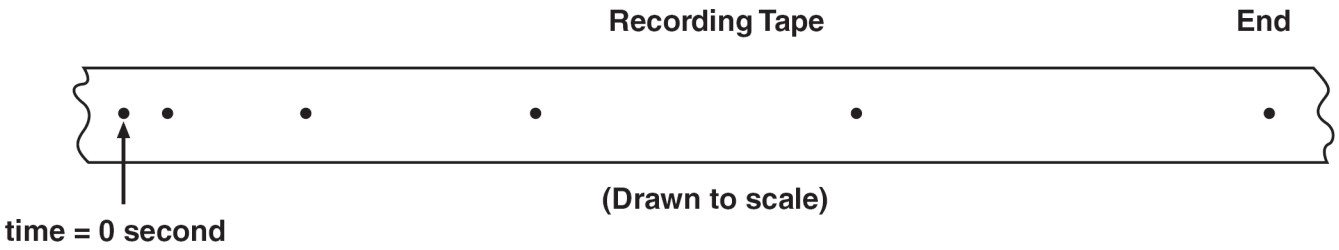
Regents Review Test 1

Base your answers to questions **34** through **37** on the information and diagram below.

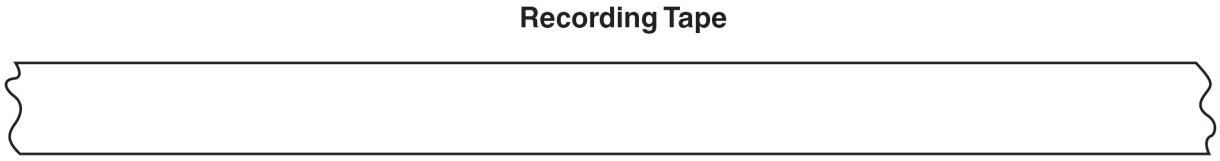
A spark timer is used to record the position of a lab cart accelerating uniformly from rest. Each 0.10 second, the timer marks a dot on a recording tape to indicate the position of the cart at that instant, as shown.



34. Calculate the average speed of the cart during the time interval t = 0 second to t = 0.30 second. [Show all work, including the equation and substitution with units.]

35. Calculate the magnitude of the acceleration of the cart during the time interval t = 0 second to t = 0.30 second. [Show all work, including the equation and substitution with units.]

36. On the diagram below, mark *at least four* dots to indicate the position of a cart traveling at a constant velocity.



37. Using a metric ruler, measure the distance the cart traveled during the interval t = 0 second to t = 0.30 second. Record your answer below, to the *nearest tenth of a centimeter*.

_____ cm

---

38. A 110-kilogram bodybuilder and his 55-kilogram friend run up identical flights of stairs. The bodybuilder reaches the top in 4.0 seconds while his friend takes 2.0 seconds. Compared to the power developed by the bodybuilder while running up the stairs, the power developed by his friend is
    1) half as much
    2) twice as much
    3) four times as much
    4) the same

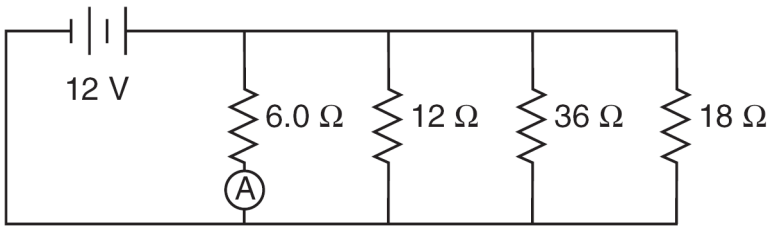
39. Two waves having the same amplitude and frequency are traveling in the same medium. Maximum destructive interference will occur when the phase difference between the waves is
    1) 0°
    2) 180°
    3) 90°
    4) 270°

40. What is the total number of quarks in a helium nucleus consisting of 2 protons and 2 neutrons?
    1) 4
    2) 16
    3) 12
    4) 8

Version C

Regents Review Test 1

Base your answers to questions **41** through **43** on the diagram below, which represents an electric circuit consisting of four resistors and a 12-volt battery.



41. What is the current measured by ammeter *A*?
    1) 72 A
    2) 4.0 A
    3) 0.50 A
    4) 2.0 A

42. What is the equivalent resistance of this circuit?
    1) 18 Ω
    2) 72 Ω
    3) 3.0 Ω
    4) 0.33 Ω

43. How much power is dissipated in the 36-ohm resistor?
    1) 110 W
    2) 3.0 W
    3) 48 W
    4) 4.0 W

---

44. What happens to the speed and frequency of a light ray when it passes from air into water?
    1) The speed decreases and the frequency increases.
    2) The speed decreases and the frequency remains the same.
    3) The speed increases and the frequency remains the same.
    4) The speed increases and the frequency increases.

45. A photon having an energy of 9.40 electronvolts strikes a hydrogen atom in the ground state. Why is the photon *not* absorbed by the hydrogen atom?
    1) The photon striking the atom is moving too fast.
    2) The photon's energy is too small.
    3) The atom's orbital electron is moving too fast.
    4) The photon is being repelled by electrostatic force.

46. A woman with horizontal velocity v_1 jumps off a dock into a stationary boat. After landing in the boat, the woman and the boat move with velocity v_2. Compared to velocity v_1, velocity v_2 has
    1) the same magnitude and opposite direction
    2) larger magnitude and the same direction
    3) the same magnitude and the same direction
    4) smaller magnitude and the same direction

47. Which wavelength is in the infrared range of the electromagnetic spectrum?
    1) 100 μm
    2) 100 mm
    3) 100 m
    4) 100 nm

48. Which object has the greatest inertia?
    1) a 5.0-kg object moving at a speed of 5.0 m/s
    2) a 20.-kg object at rest
    3) a 15-kg object moving at a speed of 1.0 m/s
    4) a 10.-kg object moving at a speed of 3.0 m/s

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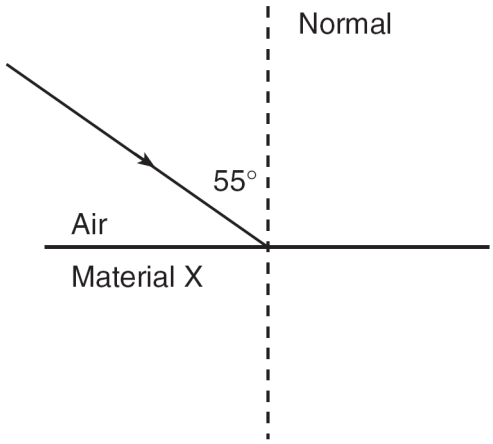
Regents Review Test 1

Base your answers to questions **49** through **52** on the information and diagram below.

A ray of light ($f = 5.09 \times 10^{14}$ Hz) is incident on the boundary between air and an unknown material *X* at an angle of incidence of 55°, as shown. The absolute index of refraction of material *X* is 1.66.



49. On the diagram above, use a straightedge and protractor to draw the refracted ray of light in material *X*.

50. Determine the speed of this ray of light in material *X*.

_____ m/s

51. Identify a substance of which material *X* may be composed.

52. Calculate the angle of refraction of the ray of light in material *X*. [Show all work, including the equation and substitution with units.]

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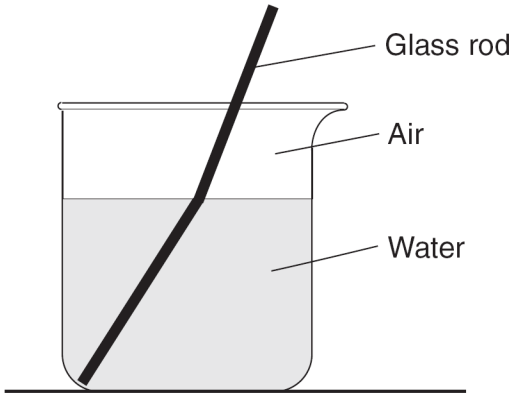
53. A straight glass rod appears to bend when placed in a beaker of water, as shown in the diagram below.

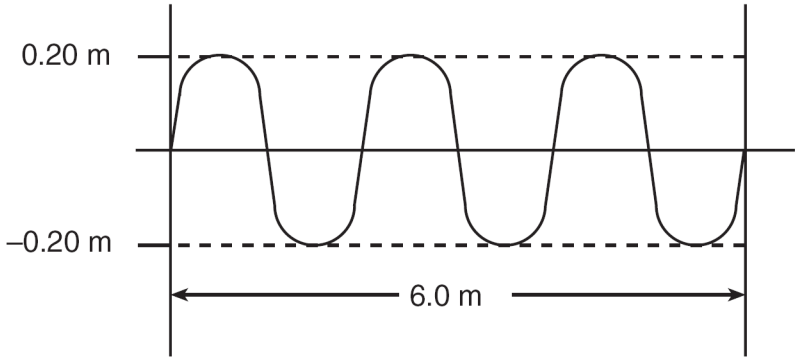


What is the best explanation for this phenomenon?

1) Light is refracted as it crosses the air-water interface.
2) Light is reflected at the air-water interface.
3) The water is warmer than the air.
4) Light travels faster in water than in air.

Version C

54. The diagram below represents a wave.



What is the speed of the wave if its frequency is 8.0 hertz?
1) 3.2 m/s 2) 16 m/s 3) 48 m/s 4) 1.6 m/s

---

55. A spring with a spring constant of 80. newtons per meter is displaced 0.30 meter from its equilibrium position. The potential energy stored in the spring is
1) 24 J 3) 7.2 J
2) 3.6 J 4) 12 J

56. If the distance separating an electron and a proton is halved, the magnitude of the electrostatic force between these charged particles will be
1) quadrupled 3) quartered
2) doubled 4) unchanged

57. What is the magnitude of the force needed to keep a 60.-newton rubber block moving across level, dry asphalt in a straight line at a constant speed of 2.0 meters per second?
1) 120 N 3) 40. N
2) 51 N 4) 60. N

58. Which quantity and unit are correctly paired?
1) resistivity and Ω/m
2) current and C•s
3) potential difference and eV
4) electric field strength and $\frac{N}{C}$

59. What is the wavelength of a light ray with frequency 5.09×10^{14} hertz as it travels through Lucite?
1) 7.64×10^{14} m 3) 5.89×10^{-7} m
2) 3.39×10^{14} m 4) 3.93×10^{-7} m

60. As a transverse wave travels through a medium, the individual particles of the medium move
1) perpendicular to the direction of wave travel
2) in circles
3) in ellipses
4) parallel to the direction of wave travel

61. **Note that the following question has only three choices.**

If the amplitude of a wave traveling in a rope is doubled, the speed of the wave in the rope will
1) remain the same 3) increase
2) decrease

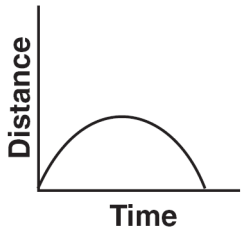
Version C

62. A cart travels with a constant nonzero acceleration along a straight line. Which graph best represents the relationship between the distance the cart travels and time of travel?

1) 

2) 

3) 

4) 

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63. In the diagram below, *P* is a point near a negatively charged sphere.

Which vector best represents the direction of the electric field at point *P*?

1)

3) 

2) 

4) 

64. What is the net electrical charge on a magnesium ion that is formed when a neutral magnesium atom loses two electrons?

1) -3.2×10^{-19} C
2) $+1.6 \times 10^{-19}$ C
3) $+3.2 \times 10^{-19}$ C
4) -1.6×10^{-19} C

65. If 60. joules of work are required to move 5.0 coulombs of charge between two points in an electric field, what is the potential difference between these points?

1) 300 V
2) 60. V
3) 12 V
4) 5.0 V

66. A car increases its speed from 9.6 meters per second to 11.2 meters per second in 4.0 seconds. The average acceleration of the car during this 4.0-second interval is

1) 2.4 m/s^2
2) 2.8 m/s^2
3) 2.8 m/s^2
4) 0.40 m/s^2

67. The work done in accelerating an object along a frictionless horizontal surface is equal to the change in the object's

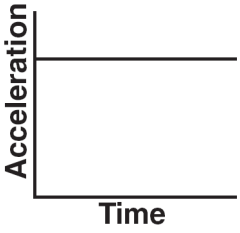
1) momentum
2) potential energy
3) kinetic energy
4) velocity

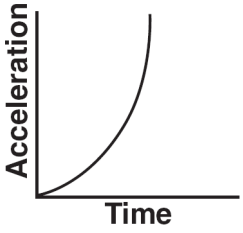
68. Metal sphere *A* has a charge of –2 units and an identical metal sphere, *B*, has a charge of –4 units. If the spheres are brought into contact with each other and then separated, the charge on sphere *B* will be

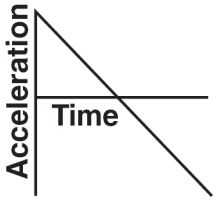
1) –3 units
2) 0 units
3) +4 units
4) –2 units

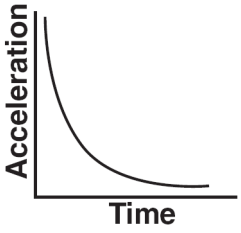
Version C

69. Which graph best represents the relationship between the acceleration of an object falling freely near the surface of Earth and the time that it falls?

1) 

2) 

3) 

4) 

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70. A machine launches a tennis ball at an angle of 25° above the horizontal at a speed of 14 meters per second. The ball returns to level ground. Which combination of changes *must* produce an increase in time of flight of a second launch?
    1) increase the launch angle and increase the ball's initial speed
    2) decrease the launch angle and increase the ball's initial speed
    3) increase the launch angle and decrease the ball's initial speed
    4) decrease the launch angle and decrease the ball's initial speed

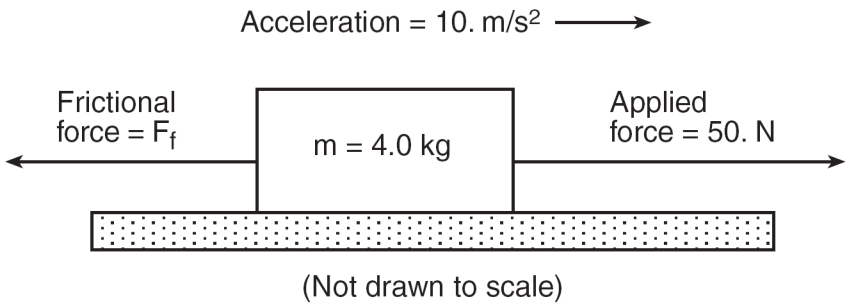
71. A plane flying horizontally above Earth's surface at 100. meters per second drops a crate. The crate strikes the ground 30.0 seconds later. What is the magnitude of the horizontal component of the crate's velocity just before it strikes the ground? [Neglect friction.]
    1) 0 m/s
    2) 294 m/s
    3) 394 m/s
    4) 100. m/s

72. What is the speed of a radio wave in a vacuum?
    1) 1.13×10^{3} m/s
    2) 3.00×10^{8} m/s
    3) 0 m/s
    4) 3.31×10^{2} m/s

73. Calculate the resistance of a 1.00-kilometer length of nichrome wire with a cross-sectional area of 3.50×10^{-6} meter^2 at 20°C. [Show all work, including the equation and substitution with units.]

74. A generator produces a 115-volt potential difference and a maximum of 20.0 amperes of current. Calculate the total electrical energy the generator produces operating at maximum capacity for 60. seconds. [Show all work, including the equation and substitution with units.]

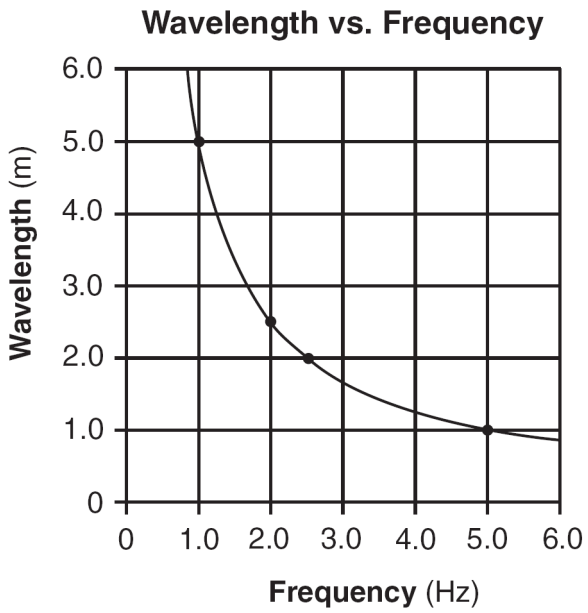
75. The diagram below shows a 4.0-kilogram object accelerating at 10. meters per second^2 on a rough horizontal surface.



What is the magnitude of the frictional force F_f acting on the object?

1) 5.0 N 2) 40. N 3) 20. N 4) 10. N

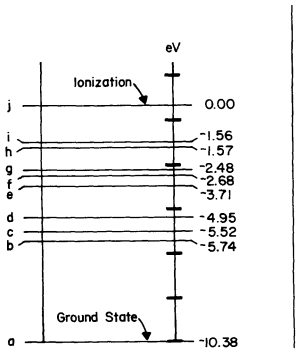
76. The graph below represents the relationship between wavelength and frequency of waves created by two students shaking the ends of a loose spring.



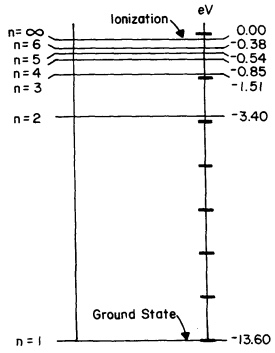
Calculate the speed of the waves generated in the spring. [Show all work, including the equation and substitution with units.]

Reference Tables

ENERGY LEVEL DIAGRAMS FOR MERCURY AND HYDROGEN



A few energy levels for the mercury atom



Energy levels for the hydrogen atom

Reference Tables

MODERN PHYSICS

$W_o = hf_o$

$E_{photon} = hf$

$KE_{max} = hf - W_o$

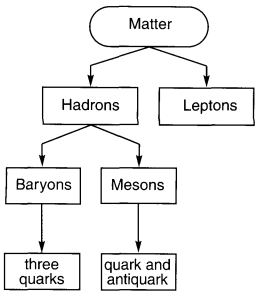
$p = \frac{h}{\lambda}$

$E_{photon} = E_i - E_f$

c = speed of light in a vacuum
E = energy
f = frequency
f_o = threshold frequency
h = Planck's constant
KE = kinetic energy
p = momentum
W_o = work function
λ = wavelength

Reference Tables

Classification of Matter



Particles of the Standard Model

Quarks

Name	up	charm	top
Symbol	u	c	t
Charge	$+\frac{2}{3}$ e	$+\frac{2}{3}$ e	$+\frac{2}{3}$ e
	down	strange	bottom
	d	s	b
	$-\frac{1}{3}$ e	$-\frac{1}{3}$ e	$-\frac{1}{3}$ e

Leptons

electron	muon	tau
e	μ	τ
−1e	−1e	−1e
electron neutrino	muon neutrino	tau neutrino
ν_e	ν_μ	ν_τ
0	0	0

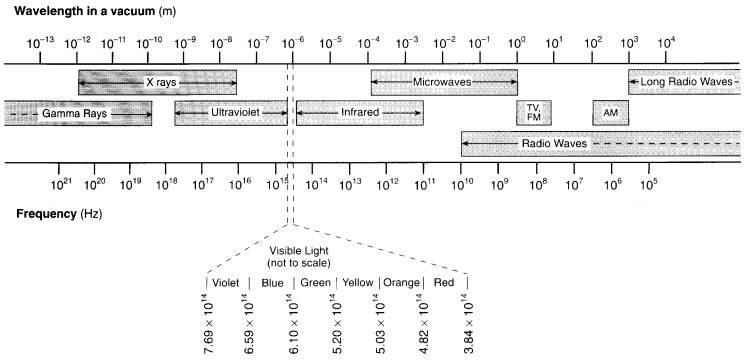
Note: For each particle there is a corresponding antiparticle with a charge opposite that of its associated particle.

Reference Tables

Absolute Indices of Refraction ($f = 5.09 \times 10^{14}$ Hz)	
Air	1.00
Corn oil	1.47
Diamond	2.42
Ethyl alcohol	1.36
Glass, crown	1.52
Glass, flint	1.66
Glycerol	1.47
Lucite	1.50
Quartz, fused	1.46
Sodium chloride	1.54
Water	1.33
Zircon	1.92

Reference Tables

The Electromagnetic Spectrum



Reference Tables

List of Physical Constants		
Name	**Symbol**	**Value**
Universal gravitational constant	G	6.67×10^{-11} N•m^2/kg^2
Acceleration due to gravity	g	9.81 m/s^2
Speed of light in a vacuum	c	3.00×10^8 m/s
Speed of sound in air at STP		3.31×10^2 m/s
Mass of Earth		5.98×10^{24} kg
Mass of the Moon		7.35×10^{22} kg
Mean radius of Earth		6.37×10^6 m
Mean radius of the Moon		1.74×10^6 m
Mean distance—Earth to the Moon		3.84×10^8 m
Mean distance—Earth to the Sun		1.50×10^{11} m
Electrostatic constant	k	8.99×10^9 N•m^2/C^2
1 elementary charge	e	1.60×10^{-19} C
1 coulomb (C)		6.25×10^{18} elementary charges
1 electronvolt (eV)		1.60×10^{-19} J
Planck's constant	h	6.63×10^{-34} J•s
1 universal mass unit (u)		9.31×10^2 MeV
Rest mass of the electron	m_e	9.11×10^{-31} kg
Rest mass of the proton	m_p	1.67×10^{-27} kg
Rest mass of the neutron	m_n	1.67×10^{-27} kg

Regents Review Test 1
Answer Key
NYS Regents [Jan 25, 2007]

1. 1

2. 3

3. 3

4. 4

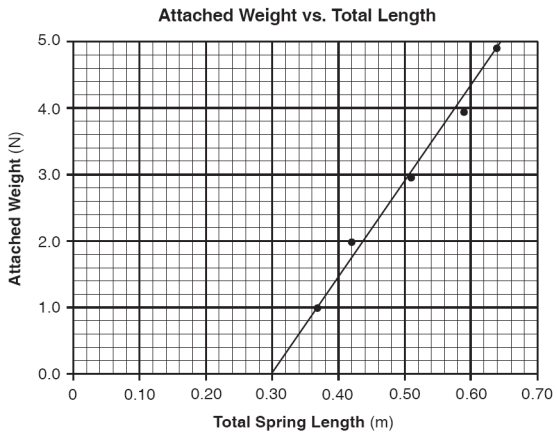
5. 4

6. 4

7. Plot all the data points ± 0.3 grid space.

8. 0.30 m ± 0.01 m

9.



10. 2

11. 4

12. 2

13. 2

14. 3

15. 4

16. $R = \frac{V}{I}$

$R = \frac{120\text{ V}}{0.50\text{ A}}$

$R = 240\ \Omega$

17. $P = I^2R$

$P = (0.50\text{ A})^2\ (50.\ \Omega)$

$P = 12$ W *or* 12.5 W

18. 190 Ω

19. 2

20. 4

21. 4

22. 4

23. 2

24. *Examples:* — Although matter is only created in matter–antimatter pairs, most matter is normal. — matter, not ½ antimatter — It should be balanced by antimatter. — Matter can only be created in particle–antiparticle pairs.

25. antiproton.

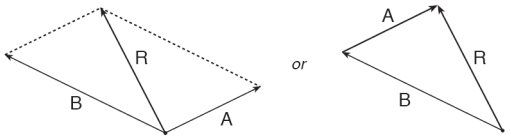
26. *Examples:* — identical — the same

27. 4

28. 3

29. 1

30.



Construct the resultant 3.7 cm ± 0.2 cm long, at an angle of 36° ± 2° from vector *B*.

31. 7.4 N ± 0.4 N

32. 2.0 N ± 0.2 N

33. 3

34. $\bar{v} = \frac{d}{t}$

$\bar{v} = \frac{5.4\text{ cm}}{0.30\text{ s}}$

$\bar{v} = 18$ cm/s *or* 0.18 m/s

35. $d = v_i t + \frac{1}{2}at^2$

$a = \frac{2d}{t^2}$

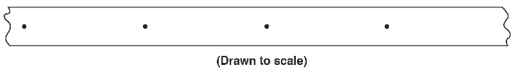
$a = \frac{2(5.4\text{ cm})}{(0.30\text{ s})^2}$

$a = 120\text{ cm/s}^2$ *or* 1.2 m/s^2

Version C

Regents Review Test 1
Answer Key
NYS Regents [Jan 25, 2007]

36.



37. 5.4 cm ± 0.2 cm.

38. 4

39. 2

40. 3

41. 4

42. 3

43. 4

44. 2

45. 2

46. 4

47. 1

48. 2

49.

50. 1.81×10^8 m/s.

51. flint glass.

52.

$$n_1 \sin\theta_1 = n_2 \sin\theta_2$$

$$\sin\theta_2 = \frac{n_1 \sin\theta_1}{n_2}$$

$$\sin\theta_2 = \frac{1.00(\sin 55°)}{1.66} \quad or$$

$$\sin\theta_2 = 0.493$$

$$\theta_2 = 30.° \text{ or } 29.6°$$

$$n = \frac{\sin i}{\sin r}$$

$$r = \sin^{-1}\left(\frac{\sin i}{n}\right)$$

$$r = \sin^{-1}\left(\frac{\sin 55°}{1.66}\right)$$

$$r = 30.°$$

53. 1

54. 2

55. 2

56. 1

57. 3

58. 4

59. 4

60. 1

61. 1

62. 3

63. 1

64. 3

65. 3

66. 4

67. 3

68. 1

69. 1

70. 1

71. 4

72. 2

73.

$$R = \frac{\rho L}{A}$$

$$R = \frac{(150. \times 10^{-8}\ \Omega \bullet \text{m})\ (1.00 \times 10^{3}\ \text{m})}{3.50 \times 10^{-6}\ \text{m}^2}$$

$$R = 429\ \Omega$$

74. $W = VIt$
$W = (115\text{ V})\ (20.0\text{ A})\ (60.\text{ s})$
$W = 1.4 \times 10^5$ J *or* 138 000 J

75. 4

76.

$$v = f\lambda$$
$$v = (5.0\text{ Hz})(1.0\text{ m})$$
$$v = 5.0\text{ m/s}$$

or

$$v = f\lambda$$
$$v = (2.0\text{ Hz})(2.5\text{ m})$$
$$v = 5.0\text{ m/s}$$

Version C